

## CLAIMS

What is claimed is:

- 1    1.    A method of authenticating a network device, comprising the computer-implemented  
2    steps of:  
3         determining that a network link that uses a primary signaling technology and a  
4                 secondary signaling technology is coupled to the network device;  
5         obtaining, using the secondary signaling technology, a unique link identifier that is  
6                 associated with the network link using the secondary signaling technology;  
7         establishing the unique link identifier as a unique device identifier; and  
8         authenticating the network device to a service provider by communicating the unique  
9                 device identifier to the service provider over the network link using the  
10                 primary signaling technology.
  
- 1    2.    A method as recited in Claim 1, further comprising the steps of receiving a  
2    configuration from the service provider over the network link using the primary signaling  
3    technology.
  
- 1    3.    A method as recited in Claim 1, wherein the secondary signaling technology is  
2    integrated services digital network (ISDN) signaling.
  
- 1    4.    A method as recited in Claim 1, wherein the secondary signaling technology is ISDN,  
2    and wherein the unique link identifier is a telephone number associated with an ISDN line  
3    coupled to the network device.
  
- 1    5.    A method as recited in Claim 1, wherein the secondary signaling technology is ISDN,  
2    and wherein the obtaining step comprises obtaining a telephone number associated with an  
3    ISDN line coupled to the network device using a caller ID function.

1       6.     A method as recited in Claim 1, wherein the network device is a residential  
2     broadband router, wherein the primary signaling technology is asynchronous digital  
3     subscriber line (ADSL), and wherein the secondary signaling technology is ISDN.

1       7.     A method as recited in Claim 1, wherein the network device is a residential  
2     broadband router, wherein the primary signaling technology is ADSL, wherein the secondary  
3     signaling technology is ISDN, and wherein the unique link identifier is a telephone number  
4     associated with an ISDN line.

1       8.     A method as recited in Claim 7, wherein the step of registering the network device  
2     with a service provider comprises using the ADSL line to connect to a Cisco Intelligent  
3     Engine 2100 (IE2100) device associated with the service provider, and providing the unique  
4     device identifier to the IE2100.

1       9.     A method as recited in Claim 1, wherein the step of registering the network device  
2     with a service provider comprises using the primary signaling technology to connect to a  
3     configuration server associated with the service provider, and providing the unique device  
4     identifier to the configuration server.

1       10.    A method of authenticating a broadband customer premises network device that is  
2     communicatively coupled to an ISDN line that supports ADSL over ISDN, the method  
3     comprising the computer-implemented steps of:  
4              obtaining, using the ISDN line, an ISDN telephone number uniquely associated with  
5                  the ISDN line;  
6              establishing the ISDN telephone number as a unique identifier of the broadband  
7                  customer premises network device; and  
8              authenticating the network device to a broadband network service provider by  
9                  providing the unique identifier to the service provider using ADSL  
10                 communication over the ISDN line.

1       11.     A method as recited in Claim 10, further comprising the steps of receiving a  
2     configuration from the service provider.

1       12.     A method as recited in Claim 10, wherein the obtaining step comprises obtaining a  
2     telephone number associated with the ISDN line using a caller ID function.

1       13.     A method as recited in Claim 10, wherein the step of registering the network device  
2     with the service provider comprises using ADSL over ISDN to connect to a Cisco Intelligent  
3     Engine 2100 (IE2100) device associated with the service provider, and providing the unique  
4     device identifier to the IE2100.

1       14.     A method of deploying a network device, comprising the steps of:  
2             receiving a customer premises equipment (CPE) device at a customer premises;  
3             coupling a network link that supports a primary signaling technology and a secondary  
4             signaling technology to the network device;  
5             obtaining, using the secondary signaling technology, a unique link identifier  
6             associated with the network link;  
7             establishing the unique link identifier as a unique identifier of the CPE device;  
8             connecting to a network service provider using the primary signaling technology;  
9             authenticating the CPE device to a service provider by providing the unique device  
10            identifier over the network link using the primary signaling technology; and  
11            receiving, from the service provider, a configuration for the CPE device over the  
12            network link.

1       15.     A computer-readable medium carrying one or more sequences of instructions for  
2     authenticating a network device, which instructions, when executed by one or more  
3     processors, cause the one or more processors to carry out the steps of:  
4             determining that a network link that uses a primary signaling technology and a  
5             secondary signaling technology is coupled to the network device;

6           obtaining, using the secondary signaling technology, a unique link identifier that is  
7           associated with the network link using the secondary signaling technology;  
8           establishing the unique link identifier as a unique device identifier; and  
9           authenticating the network device to a service provider by communicating the unique  
10          device identifier to the service provider over the network link using the  
11          primary signaling technology.

1   16.   A computer-readable medium as recited in Claim 15, further comprising the steps of  
2   receiving a configuration from the service provider.

1   17.   A computer-readable medium as recited in Claim 15, wherein the secondary signaling  
2   technology is ISDN.

1   18.   A computer-readable medium as recited in Claim 15, wherein the secondary signaling  
2   technology is ISDN, and wherein the unique link identifier associated with the secondary  
3   telecommunication link is a telephone number associated with an ISDN line.

1   19.   A computer-readable medium as recited in Claim 15, wherein the secondary signaling  
2   technology is ISDN, and wherein the obtaining step comprises obtaining a telephone number  
3   associated with an ISDN line using a caller ID function.

1   20.   A computer-readable medium as recited in Claim 15, wherein the network device is a  
2   residential broadband router, and wherein the primary signaling technology is ADSL.

1   21.   A computer-readable medium as recited in Claim 15, wherein the network device is a  
2   residential broadband router, wherein the primary signaling technology is ADSL, wherein the  
3   secondary signaling technology is ISDN, and wherein the unique link identifier associated  
4   with the secondary telecommunication link is a telephone number associated with an ISDN  
5   line.

1    22. A computer-readable medium as recited in Claim 21, wherein the step of registering  
2    the network device with a service provider comprises using ADSL to connect to a Cisco  
3    Intelligent Engine 2100 (IE2100) device associated with the service provider, and providing  
4    the unique device identifier to the IE2100.

1    23. A computer-readable medium as recited in Claim 15, wherein the step of registering  
2    the network device with a service provider comprises using the primary signaling technology  
3    to connect to a configuration server associated with the service provider, and providing the  
4    unique device identifier to the configuration server.

1    24. An apparatus for configuring a network device, comprising:  
2        means for determining that a network link that uses a primary signaling technology  
3                  and a secondary signaling technology is coupled to the network device;  
4        means for obtaining, using the secondary signaling technology, a unique link  
5                  identifier that is associated with the network link using the secondary  
6                  signaling technology;  
7        means for establishing the unique link identifier as a unique device identifier; and  
8        means for authenticating the network device to a service provider by communicating  
9                  the unique device identifier to the service provider over the network link using  
10                 the primary signaling technology.

1    25. An apparatus as recited in Claim 24, further comprising:  
2        means for receiving a configuration from the service provider over the primary  
3                  network link; and  
4        means for initiating in-service operation.

1    26. An apparatus as recited in Claim 24, wherein the secondary signaling technology is  
2    ISDN.

1    27. An apparatus as recited in Claim 24, wherein the secondary signaling technology is  
2    ISDN, and wherein the unique link identifier associated with the secondary signaling  
3    technology is a telephone number associated with an ISDN line.

1    28. An apparatus as recited in Claim 24, wherein the secondary signaling technology is  
2    ISDN, and wherein the obtaining means comprises means for obtaining a telephone number  
3    associated with the ISDN line using a caller ID function.

1    29. An apparatus as recited in Claim 24, wherein the network device is a residential  
2    broadband router, and wherein the primary signaling technology is ADSL.

1    30. An apparatus as recited in Claim 24, wherein the network device is a residential  
2    broadband router, wherein the primary signaling technology is ADSL, wherein the secondary  
3    signaling technology is ISDN, and wherein the unique link identifier associated with the  
4    secondary signaling technology is a telephone number associated with an ISDN line.

1    31. An apparatus as recited in Claim 30, wherein the step of registering the network  
2    device with a service provider comprises using ADSL to connect to a Cisco Intelligent  
3    Engine 2100 (IE2100) device associated with the service provider, and providing the unique  
4    device identifier to the IE2100.

1    32. An apparatus as recited in Claim 24, wherein the registering means comprises means  
2    for using the primary signaling technology to connect to a configuration server associated  
3    with the service provider, and for providing the unique device identifier to the configuration  
4    server.

1    33. An apparatus for configuring a network device, comprising:  
2    a network interface that is coupled to the data network for receiving one or more packet  
3    flows therefrom;

4 a processor;  
5 one or more stored sequences of instructions which, when executed by the processor, cause  
6 the processor to carry out the steps of:  
7 determining that a network link that uses a primary signaling technology and a  
8 secondary signaling technology is coupled to the network device;  
9 obtaining, using the secondary signaling technology, a unique link identifier that is  
10 associated with the network link using the secondary signaling technology;  
11 establishing the unique link identifier as a unique device identifier; and  
12 authenticating the network device to a service provider by communicating the unique  
13 device identifier to the service provider over the network link using the  
14 primary signaling technology.

1 34. An apparatus as recited in Claim 33, further comprising the steps of receiving a  
2 configuration from the service provider.

1 35. An apparatus as recited in Claim 33, wherein the secondary signaling technology is  
2 ISDN.

1 36. An apparatus as recited in Claim 33, wherein the secondary signaling technology is  
2 ISDN, and wherein the unique link identifier associated with the secondary signaling  
3 technology is a telephone number associated with an ISDN line.

1 37. An apparatus as recited in Claim 33, wherein the secondary signaling technology is  
2 ISDN, and wherein the obtaining step comprises obtaining a telephone number associated  
3 with an ISDN line using a caller ID function.

1 38. An apparatus as recited in Claim 33, wherein the network device is a residential  
2 broadband router, and wherein the primary signaling technology is ADSL.

1   39. An apparatus as recited in Claim 33, wherein the network device is a residential  
2   broadband router, wherein the primary signaling technology is ADSL, wherein the secondary  
3   signaling technology is ISDN, and wherein the unique link identifier associated with the  
4   secondary signaling technology is a telephone number associated with an ISDN line.

1   40. An apparatus as recited in Claim 7, wherein the step of registering the network device  
2   with a service provider comprises using the ADSL line to connect to a Cisco Intelligent  
3   Engine 2100 (IE2100) device associated with the service provider, and providing the unique  
4   device identifier to the IE2100.

1   41. An apparatus as recited in Claim 33, wherein the step of registering the network  
2   device with a service provider comprises using the primary signaling technology to connect  
3   to a configuration server associated with the service provider, and providing the unique  
4   device identifier to the configuration server.